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**A PRELIMINARY ENVIRONMENTAL
ASSESSMENT OF WETLAND RESTORATION
ALTERNATIVES FOR BIG LAGOON
AT MUIR BEACH, MARIN COUNTY**

Prepared for

**The California Department of Transportation
District IV**

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"Crossing a belt of mountains, we struck the sea shore, and turning to the northward, ascended a succession of steep hills, until we had gained a rocky table-land above—there was no timber to be seen, and except the stunted undergrowth netted together in valleys and ravines, all was one rolling scene of grass, wild oats, and flowers. Nearby was a small sheet of fresh water, caught by the rain and held in by a narrow plateau, swarming with water fowl, and framed by broken masses of huge rocks. It was a great resort for deer, and I found them herding in large bands of thirty and forty together, but from the nature of the county, so open and free of foliage, it required the utmost caution to approach within striking distance."

Lieutenant Henry Wise, US Navy, 1849
West Marin near Big Lagoon

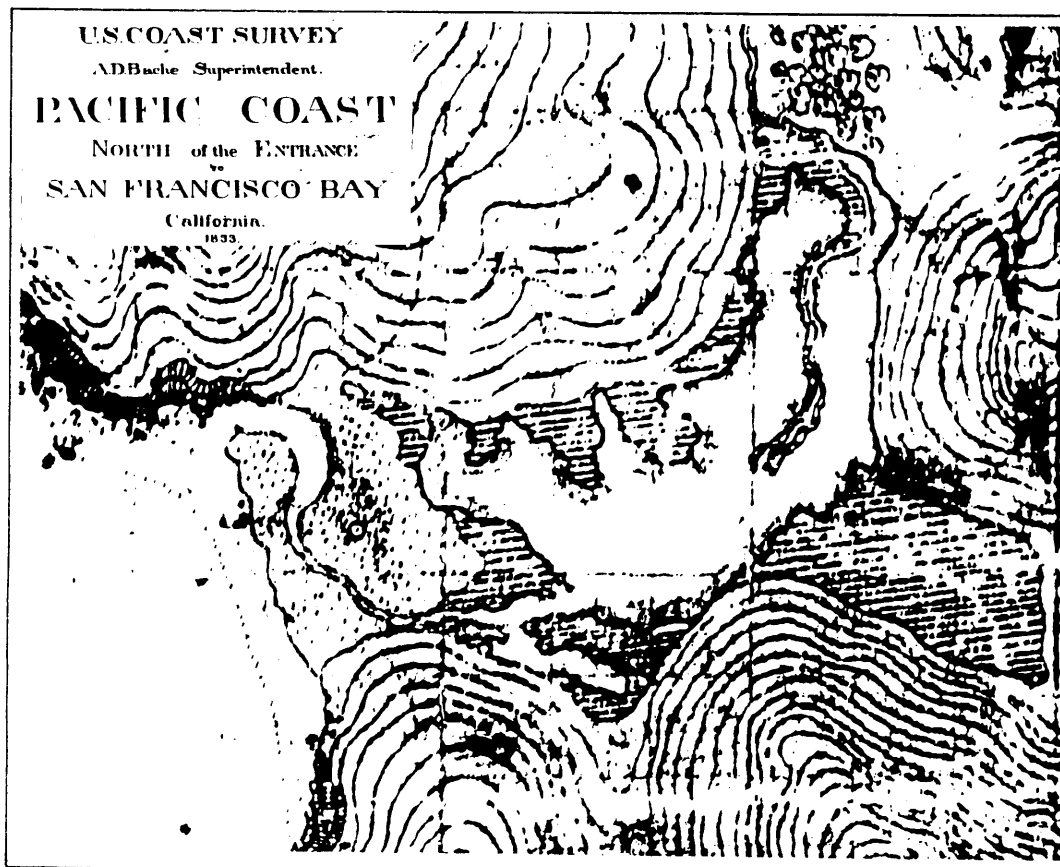


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I. INTRODUCTION

As a result of the reconstruction of Highway 1 at the Lone Tree Slide in Marin County, the California Department of Transportation (Caltrans) is required to mitigate for the loss of 5.6 acres of marine habitat. In 1991 an interagency technical advisory committee (TAC) was formed to establish mitigation goals and objectives and evaluate potential mitigation sites. After reviewing several sites within the Marin County coastal zone, removal of artificial fill in Bolinas Lagoon and wetland restoration at Big Lagoon were identified as having the highest potential for satisfying compensatory mitigation requirements.

In June of 1992 a preliminary design was developed for removal of about 2 acres of intertidal fill at Bolinas Lagoon. This portion of the mitigation has been approved by the agencies, and construction has been completed. Caltrans is now required to mitigate for the remaining 3.6 acres of marine impacts.

Big Lagoon is located near the community of Muir Beach in Marin County (Figure I-1). The site is at the downstream end of the Redwood Creek watershed, and currently includes an intermittently-tidal lagoon as well as riparian and seasonal wetland habitat. The site was identified as having high potential for mitigation for the following reasons:

- The Redwood Creek watershed is unique among California coastal watersheds of its size because it remains largely undeveloped and is protected as State and Federal Park lands. The riparian corridor is relatively intact upstream of Big Lagoon and has recovered rapidly from the adverse impacts of historic grazing.
- From an ecosystem perspective the Big Lagoon area can provide key freshwater wetland and transitional estuarine habitat, and in its modified and degraded state has previously been identified as a weak link in the Redwood Creek ecosystem. The existing wetlands are fragmented and vulnerable to sedimentation, hydrologic changes, and invasion by exotic species.
- Redwood Creek currently contains sustainable populations of coho salmon and steelhead, as well as other special status species.
- Although much of the potential restoration at the site is freshwater habitat, the lagoon is near the Lone Tree Slide and provides important habitat for fish species that migrate to the ocean.

- Historical information indicates that the site once supported a large freshwater lagoon and wetland system, most of which was lost in the last century due to sedimentation, filling, and channelization.

To evaluate the potential for wetland restoration at Big Lagoon, Caltrans retained a team of consultants that included Philip Williams and Associates, Ltd. (PWA, hydrologists), Moss Landing Marine Laboratories (MLML, ecologists), and Dr. Jerry Smith of San Jose State University (fisheries). John Northmore Roberts and Associates and the National Park Service also provided input on land use issues under a separate contract with the Golden Gate National Park Association. This team of consultants was asked to develop restoration alternatives and prepare a preliminary environmental assessment to address the following issues:

- How did the historical wetland system function, and how did it evolve into the current wetland?
- How does the existing wetland system function in terms of ecology and hydrology.
- What are the existing ecological values of the site?
- What are the alternatives for wetland restoration that recreate historic wetland functions and enhance wildlife habitat?
- How can wetland restoration minimize conflicts with existing land uses?
- What are the impacts and benefits of each alternative in terms of ecosystems, land use, and hydrology?

Because of the importance of Big Lagoon in the context of the larger Redwood Creek ecosystem, the consultant team was asked to develop planning alternatives in coordination with National Park Service objectives for restoration of the entire site. Caltrans would then contribute to the overall restoration effort to meet its 3.6 acre compensatory mitigation requirement.

This alternatives assessment will be used as the basis for further environmental review and public input through the CEQA/NEPA process. At the completion of this process a preferred alternative will be identified, and a detailed design will be developed for construction.

II. SUMMARY AND CONCLUSIONS

1. Under natural conditions the Big Lagoon site supported a 30-acre wetland ecosystem that included a freshwater lagoon, seasonal wetlands, dunes, and an intermittently tidal lagoon. These wetlands provided habitat for numerous species of invertebrates, birds, amphibians, fish, mammals, and plants.
2. Most of this habitat was lost between 1853 and the present through sedimentation, channelization, levee construction, filling, and dune removal. Predictably, alien vegetation invaded areas currently impacted by human activities.
3. Although the current Redwood Creek riparian corridor still has important habitat value, the loss of historic wetland has significantly reduced habitat for fish, amphibians, many bird species, and mammals. Many species which were once numerous on the site are now either not present or reduced to isolated and potentially vulnerable breeding populations.
4. The existing wetlands are fragmented and vulnerable to sedimentation, hydrologic changes, and invasion by exotic species.
5. In addition to the No Action alternative (Alternative A), four wetland restoration alternatives have been identified to enhance the functioning of the natural wetland system and restore historic habitat values. These alternatives would provide critical freshwater lagoon and wetland habitat for the Redwood Creek ecosystem, and would benefit fish, amphibians, birds, mammals, and wetland plants. The alternatives are summarized in Table II-1 and described below:

- **Historic Wetland Restoration (Alternative B)**

Most of the pre-1853 freshwater lagoon and seasonal wetlands would be restored. Levees and artificial fill would be removed, and Redwood Creek would be restored to its original course. This alternative would in the long-term provide the greatest habitat values, but would also require the most excavation and short-term disruption of existing habitats.

- **Restore Historic Wetland and Preserve Riparian Woodlands (Alternative C)**

Redwood Creek would be moved to its original course, and much of the pre-1853 freshwater lagoon would be restored as in Alternative B. However, excavation within the existing riparian habitat downstream of Pacific Way would be minimized.

- **Backwater Pond and Wetland (Alternative D)**

A backwater pond and seasonal wetland would be excavated in the Green Gulch pasture, and connected to lower Redwood Creek through a breach in the pasture levee. Redwood Creek would remain in its current alignment. This alternative could also be done as Phase I of Alternatives B and C, and is designed to meet the Caltrans mitigation requirements.

- **Enlarge the Intermittently Tidal Lagoon and Restore Dunes (Alternative E)**

The tidal lagoon would be increased by 0.8 acres, and fill would be removed from the area between the lagoon and parking lot picnic area. Dunes would be allowed to evolve naturally. This alternative could be done alone or as part of any of the other restoration alternatives.

6. As shown in Table II-1, the alternatives create as much as 2.3 acres and enhance up to 13.9 acres of wetland. The extent of existing jurisdictional wetlands on-site (including degraded seasonal wetlands) limits the potential for wetland creation, and the 3.6 acre Caltrans mitigation requirement will have to be met through a combination of wetland creation and enhancement.
7. Six potential sites for disposal of excavated material have been identified in lower Franks Valley and Green Gulch. There is sufficient disposal capacity within the Redwood Creek watershed for any of the restoration alternatives.
8. All of the restoration alternatives would require changes to recreation and public access in the area. Therefore, alternative locations for these activities have been proposed for each wetland restoration alternative.